Inelastic and Elastic Collisions
(test chapters 9,10,11 next Friday morning)

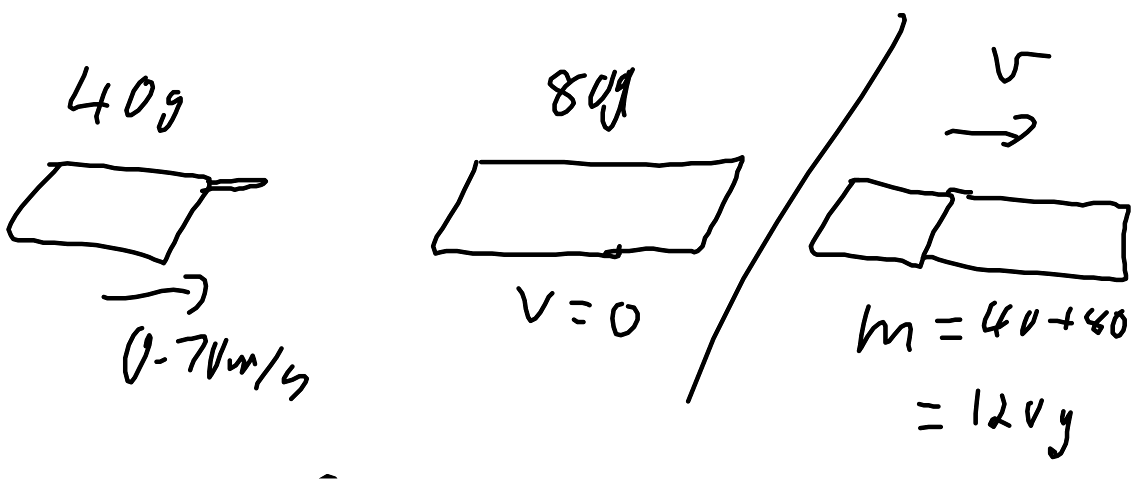
On an air track (frictionless) a 40.0 g glider is moving at 0.70 m/s when it collides with a 80.0 g glider at rest. Determine the speed after the collision and the kinetic energy lost if

a) They stick together (inelastic)
b) The 40.0 g glider bounces back at -0.20 m/s
c) Bonus: if no kinetic energy is lost (perfectly elastic collision) what are the velocities of the two gliders after the collision?

$$ax^2+bx+c=0 \qquad x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

P234 q13-16 CR 2.1-2.4
(q 15 is ugly - bonus)

Big idea:
Collision or explosion - momentum is conserved
p=mv



$$\sum P_i = \sum P_f$$

$$0.7\,\text{m/s} \times 40.0\,\text{g} = 120\,\text{g} \cdot V$$

28.

$$V = 0.23\,\text{m/s}$$

$$\Delta E_K = 0.5(m_A + m_g)V^2 - 0.5\,m_A v^2$$

$$\Delta E_K = 0.5(0.12\,\text{kg})\,0.23^2 - 0.5 \cdot 0.04\,\text{kg} \cdot 0.7^2$$

$$\Delta E_K = -0.0065\,\text{J}$$

Rocket Lab

Engine mass before and after
F-t graph on usb
Firing time
Average force
Area under the graph (impulse)

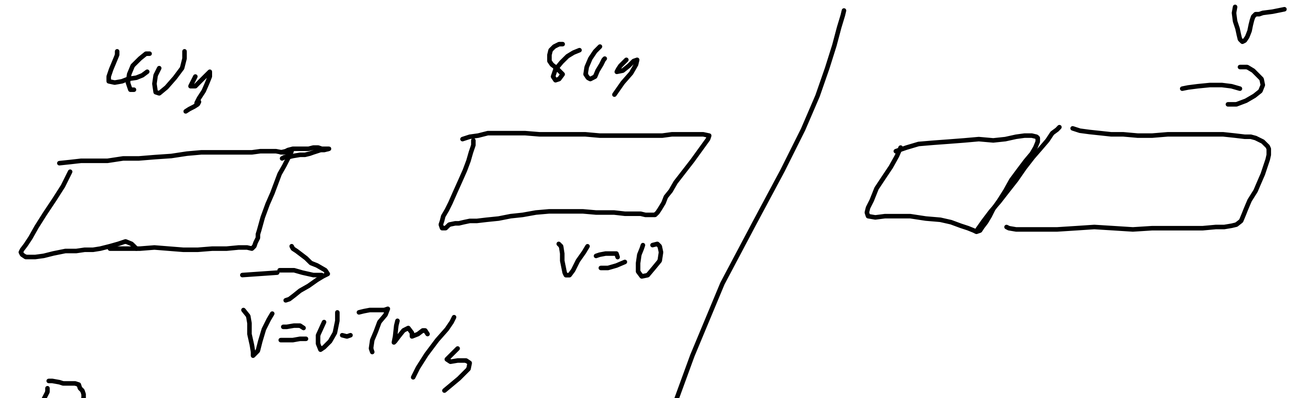
Part 4 - Method 1
Fnet = ma = Fup - Fdown
= average force - average mass x g

Part 5 - Method 2

Impulse = area under the graph - average mass x g x firing time
= m x change in velocity

Need rocket mass then add mass of the engine

Block 2-2



~~$P = FV$~~

~~$AA = Fd$~~

$P = mV$

$0.040kg \times 0.7m/s = 0.12kg \times V$

$V = 0.23\ m/s$

$E_k = \frac{1}{2} mv^2$

$m = \frac{0.04kg \times 0.07^2\ m/s}{2}$

$= 9.8 \times 10^{-3}\ J$

$E_{kf} = \frac{1}{2} mv^2$

$\Delta E_k = E_{kf} - E_{ki} = \frac{1}{2}(0.12\ kg \times 0.23^2)$

$= 3.2 \times 10^{-3} - 9.8 \times 10^{-3}$

$= -6.6 \times 10^{-3}\ J$

$= -6.6 \times 10^{-?}$ ~~$= 0.138$~~ J

$= 3.2 \times 10^{-3}$ J